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# United States Department of Agriculture,

OFFICE OF THE SECRETARY.—Circular No. 40, Revised.

## THE PRESENT OUTBREAK OF THE GRASS WORM OR FALL ARMY WORM AND RECOMMENDATIONS FOR ITS CONTROL.

The Department of Agriculture is using all the means at its disposal to meet the emergency caused by the great destruction of crops in the South by this pest. This insect has been present in unprecedented numbers from Florida to Texas and northward, damaging grass, corn, alfalfa, cowpeas, cotton, sugar cane, rice, and in fact almost any vegetation, to such an extent as to cause great anxiety on the part of planters and others. By means of an emergency appropriation by Congress it is possible for the department to render quick assistance.

Plans for this work, in cooperation with the States concerned, have been perfected. The insect will undoubtedly continue its ravages for some time, gradually spreading northward, as there are other generations to follow. For these reasons immediate action toward destroying the worms is strongly advised.

The department recommends the use of arsenicals as the most satisfactory means of destroying the worms, though other measures may be advisable in special cases. Where insecticides are used the directions given herewith must be followed implicitly, otherwise very serious injury may result. Among the poisons that may be used are arsenate of lead, Paris green, and London purple. None of these poisons should be used upon vegetation that is afterwards to be used for forage. Paris green and London purple are dangerous to use upon corn on account of the danger of injury to or the destruction of plants. In most cases it will be best to apply these poisons in dry forms instead of with water. Dry applications can be made by sifting the poisons upon the plants through light cloth sacks or by means of blowers or dusting machines. Liquid applications must be made with spraying apparatus to be effective. For this reason the dry applications meet the present emergency better than liquid ones.

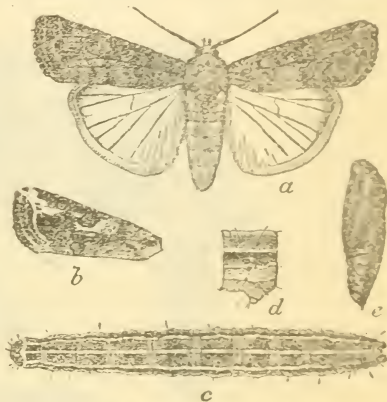


FIG. 1.—The fall army worm (*Lophyrus frugiperda*): a, Moth, plain gray form. b, forewing of *Prodenia*-like form. c, larva extended. d, abdominal segment of larva, folded view. e, pupa, lateral view. d, twice natural size, others enlarged one-fourth. (From *Entomologist*.)

Arsenate of lead in powdered form is recommended above all other arsenicals because it will not injure the foliage of any of the field crops grown in the South, even when applied without the addition of any carriers. The cost may be reduced by mixing with two or three times its weight of flour and dusting upon whatever crops the worms may be attacking. Paris green is next in effectiveness and if used in the dust form should be mixed with four or five times its weight of flour or air-slaked lime. Flour is the most satisfactory carrier to use, as the lime has the tendency simply to drive the worms to other vegetation. Lime, however, has the advantage of preventing the burning of the foliage. London purple may be used, but should be applied with air-slaked lime or flour, as recommended in the case of Paris green.

Wherever it is feasible to use liquid sprays, the paste form of arsenate of lead may be used by dissolving 2 to 2½ pounds in 50 gallons of water. Paris green may be used at the rate of about 10

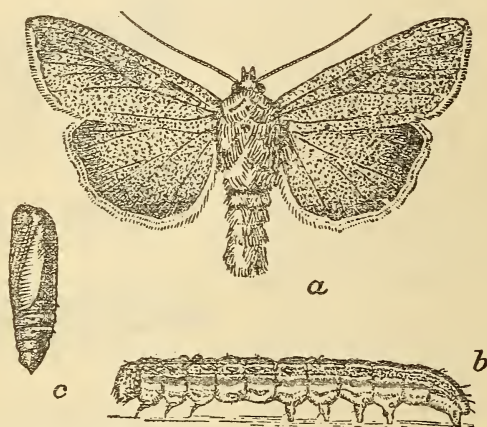


FIG. 2.—The true army worm (*Heliophila unipuncta*): a, Moth; b, larva, with eggs of tachinid parasite on back; c, pupa. Enlarged. (After Webster.)

ounces to each 50 gallons of water, but if so used 2 pounds of freshly slaked lime should also be added.

When applied to grasses or plants which have no value and which are not afterwards to be used for forage, it is not necessary to pay attention to the exact strength of the Paris green mixtures.

In the case of cotton, powdered arsenate of lead should be applied at the rate of about 5 pounds per acre. The usual method of utilizing cloth sacks carried through the field on horseback is perfectly adapted to this crop.

On forage crops and others in the case of which unfortunate results might follow the use of arsenicals, other expedients must be adopted. A most effective measure for destroying the worms without treating the crop is to mix 100 pounds of wheat bran with a couple of pounds of either Paris green or powdered arsenate of lead, or, if these are not obtainable, use 3 pounds of London purple, bringing the mass to a stiff dough by the use of 1½ to 2 gallons of molasses. If the whole mass is thoroughly mixed and dropped about on the ground where



the worms are at work they will be attracted by it, feed upon it, and be destroyed thereby. Many planters prefer this method to dusting or spraying, and the poisoned bait is said by them to attract worms from 5 to 10 inches away.

In some cases where the ground is hard, with little vegetation, a heavy roller or a brush drag may be used to advantage in crushing the worms.

When the worms have become full grown with rare exceptions they descend an inch or two into the ground, construct an earthen cell, and pass into the pupal state shown in figure 1, *c*. It has been demonstrated by several different experts in widely separated localities that from 50 to 95 per cent of these pupæ can be destroyed in the ground by thorough shallow cultivation. This can be done by disking or the use of a spring-tooth harrow, and the efficiency of the measure will depend upon the thoroughness with which the work

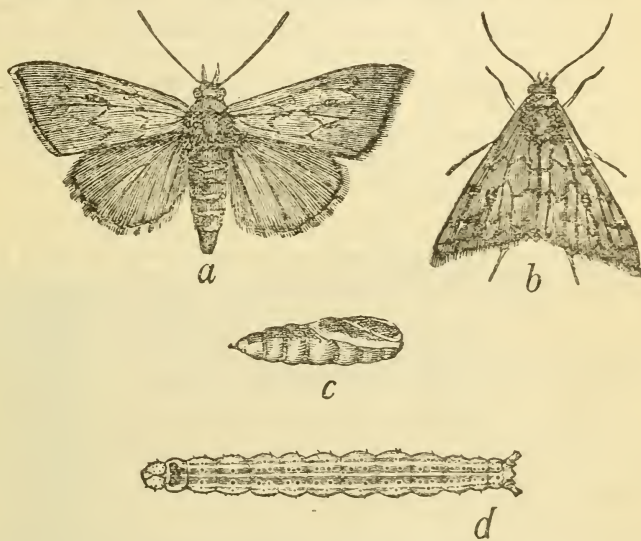


FIG. 3.—The cotton worm or caterpillar (*Alabama argillacea*): *a*, Moth, with wings spread; *b*, same, with wings closed, at rest; *c*, pupa; *d*, larva. (After Riley.)

has been done. Cultivation of the ground between the rows of corn and cotton has been found to destroy nearly all of these pupæ where the soil is sandy and has been thoroughly cultivated under hot midday sun.

The method of destroying the insects when they are in the quiet stage in the ground, to which reference has just been made, is of importance next to the use of arsenicals in checking the pests. In fact, in many cases it is by far the most effective means that can be followed.

For fields threatened with invasion but not actually attacked, a deep furrow should be plowed out around the entire circumference of the field; into this the caterpillars will fall, when they may be crushed by dragging a heavy log through the furrow. If the soil is such as to be somewhat impervious to water, this furrow may be kept partly filled with water, on the surface of which a small quantity

of kerosene may be poured, which will kill the worms almost immediately when they come into contact with it.

Since the worms seem invariably to consume the grass and other vegetation growing in fields before attacking either corn or cotton, it should prove an important method of protection to spray or dust grass and weeds in cornfields threatened with attack with arsenate of lead according to the methods advised above.

To summarize the situation, the department recommends the speedy application of arsenical poisons and the working of the ground wherever practicable, in order to prevent further damage.

In the South three entirely distinct insects are known as the army worm. One of these is *Laphygma frugiperda* S. & A., shown in figure 1. This is known as the grass or fall army worm. The true army worm, *Heliophila unipuncta* Haw., is shown in figure 2. This has not, so far, appeared generally during the present season. The third insect is the cotton worm, *Alabama argillacea* Hübn., shown in figure 3, and is absolutely restricted to cotton as a food plant and never pupates in the ground, but on the cotton plant. The species first mentioned, properly called the grass worm or fall army worm, is the one dealt with in this circular. On account of the differences in habits the species attacking cotton requires different treatment. The cotton worm, shown in figure 3, is discussed in Circular No. 153 of the Bureau of Entomology, which may be obtained on application.

**WARNING.**—Great care should be taken that cattle and other stock are kept from pasturing in the fields where the grass or other crops have been poisoned with arsenicals; also, that poisoned plants are not fed to stock.

JAMES WILSON,  
Secretary of Agriculture.

WASHINGTON, D. C., August 27, 1912.

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